UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

BARBARA SCHWAB, *et al.*,	)))	
Plaintiffs,	))	Civil Action No. CV 04-1945 (JBW)
v.	))	
PHILIP MORRIS USA, INC., *et al.*,	))	
defendants.	))))	

EXPERT REPORT OF WILLIAM WECKER

1.   My name is William E. Wecker. I am a statistician and applied mathematician. I received the Bachelor of Science degree (Basic Sciences) from the United States Air Force Academy in 1963. I received both the Master of Science degree (Operations Research, 1970) and Doctor of Philosophy degree (Statistics and Management Science, 1972) from the University of Michigan. I have served on the faculties of the University of Chicago, the University of California, Davis, and Stanford University where I taught statistics and applied mathematics at the graduate level. I have performed research in statistical theory, statistical methods, and applied mathematics for thirty-three years. I am currently President of William E. Wecker Associates, Inc., an applied mathematics consulting firm located in Novato, California. I am a member of the American Statistical Association, the Institute of Mathematical Statistics, and the Society for Risk Analysis. I have served as associate editor of the *Journal of the American Statistical Association* for four years and of the *Journal of Business and Economic Statistics* for eighteen years.

2.   I have been asked by counsel for defendants to review and comment on the reports of Drs. Hauser, Harris and Beyer.[1] I express the opinions stated herein to a reasonable degree of scientific certainty.

Comments on Dr. Hauser's Report

3.   Dr. Hauser reports his attempts to "assess the value and importance of health risks to 'light' cigarette consumers in their decision to purchase a 'light' cigarette."[2] Dr. Hauser does not accurately measure the "value" to "light" cigarette consumers of their perceived reduced health risks associated with light cigarettes. Dr. Hauser does not measure the "importance of health risks to 'light' cigarette consumers in their decision to purchase a 'light' cigarette."

4.   I have been instructed by counsel that the following legal question must be answered in this case: "To what extent have class members relied upon defendants' alleged wrongful conduct and suffered injury to business or property as a result?" Dr. Hauser does not estimate an out-of-pocket loss caused by defendants' alleged wrongful conduct. Dr. Hauser does not consider defendants' alleged wrongful conduct.

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[1] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005. Jeffery E. Harris, <u>Expert Report</u>, Schwab, et al. v. Philip Morris, et al., September 6, 2005. Dr. John C. Beyer, <u>Amended Report Regarding Class-Wide Damages and Damage Methodologies</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005.

[2] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 4.

Dr. Hauser's estimate of the value of perceived reduced health risks associated with light cigarettes

5.   Dr. Hauser estimated the value of perceived reduced health risks associated with light cigarettes from the responses to a survey of light cigarette smokers conducted by Greenfield Online.[3] The survey asked light cigarette smokers to describe their perceptions of the health risk of regular, light and ultra-light cigarettes[4] and to state their preferred choices from among various hypothetical cigarettes that differ with respect to: health risks, taste, price and pack type.[5] Dr. Hauser used the survey responses to estimate the value of perceived reduced health risks associated with light cigarettes by two methods: (1) "Willingness-to-pay (WTP) method" and (2) "Market-Based method."[6]

Dr. Hauser's Willingness-To-Pay Method

6.   Based on the survey responses, and using his willingness-to-pay method, Dr. Hauser estimates a price discount of 47.3 percent of the price per pack would be required to offset the "number of units of consumer utility that are lost, on average, from going

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[3] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 24.

[4] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, p. E19.

[5] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 30, p. E22.

[6] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 47.

from perceived health risks the same as 'light' cigarettes to perceived health risks the same as regular cigarettes." [7]

7.   The survey data on which Dr. Hauser relied permits a direct test of the reliability of Dr. Hauser's willingness-to-pay calculation. Of the 627 survey respondents, 233 responded to a question asked at the beginning of the survey (question 5b1) that they perceived no difference in health risk from smoking light versus regular cigarettes. [8] Dr. Hauser estimates that the 233 respondents who perceived no difference in risk for light versus regular cigarettes had a median willingness-to-pay of 36.0 percent of the price per pack. [9] Dr. Hauser has adduced no logical reason why smokers would be willing to pay more for the health risk of a light cigarette versus the health risk of a regular cigarette when they perceive no difference in health risk between the two.

8.   I repeated Dr. Hauser's willingness-to-pay analysis using data from only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes. Dr. Hauser's model, using only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes, estimated a median willingness-to-pay of 31:04 percent of the price per pack. [10] Dr. Hauser has adduced no logical reason why smokers would be willing to pay more for the health risk of a light cigarette versus the health risk of a regular cigarette when they perceive no difference in health risk between the two.

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[7] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 48.

[8] See my electronic material Tab01/cghr.hr.tst.sas.

[9] See my electronic material Tab01/cghr.wtp.sas.

[10] See my electronic material Tab02/light_eq_regular.xls.

9.   Dr. Hauser's willingness-to-pay calculation is unreliable because it finds a large willingness-to-pay for smokers who perceive no difference in risk. Indeed, the two smokers for whom Dr. Hauser calculates the largest willingness-to-pay both stated that they perceive no difference in health risk for light versus regular cigarettes.[11]

10.   For the smokers who perceive no reduction in risk for light versus regular cigarettes, I substituted the logical value of zero willingness-to-pay for Dr. Hauser's illogical non-zero values. With this change, the median willingness-to-pay for the full group of 627 respondents is a substantially smaller 9.6 percent of the price per pack versus the 47.3 percent reported by Dr. Hauser.[12]

11.   The Sawtooth software used by Dr. Hauser to perform his willingness-to-pay calculations allows the user to choose between constrained or unconstrained estimates of consumer utility.[13] Dr. Hauser performed both constrained and unconstrained estimates of consumer utility,[14] but he reported a median willingness-to-pay estimate based only on his constrained estimates. Dr. Hauser's reported median willingness-to-pay estimate based on his constrained estimates is 47.3 percent of the price per pack.

12.   The Sawtooth software manual warns against the use of constraints when making aggregate predictions for a population as Dr. Hauser does in his expert report:

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[11] See my electronic material Tab01/cghr.wtp.sas.

[12] See my electronic material Tab01/cghr.wtp.sas.

[13] "The CBC/HB System for Hierarchical Bayes Estimation," Version 3.2, Sawtooth Software, Inc. pp. 26, 27.

[14] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, Exhibit I. Also see Hauser electronic material /Hauser 002/Cigarette HR Study/cig_constr/Willingness to pay.spo, and /Hauser 002/Cigarette HR Study/cig_unconstr/cghru.csv.

Evidence to date suggests that constraints can be useful when the researcher is primarily interested in the prediction of individual choices, as measured by hit rates for holdout choice tasks. However, constraints appear to be less useful, and indeed can be harmful, if the researcher is primarily interested in making aggregate predictions, such as predictions of shares of choices.[15]

13.   Dr. Hauser's median unconstrained willingness-to-pay estimate is a substantially smaller value: 26.5 percent of the price per pack.[16,17] For the smokers who perceive no reduction in risk for light versus regular cigarettes, I substituted the logical value of zero willingness-to-pay for Dr. Hauser's illogical non-zero values. With this change, the median unconstrained willingness-to-pay for the full group of 627 respondents is zero percent of the price per pack.[18]

14.   Dr. Hauser commissioned a second survey, in which 1,026 respondents were asked about the risks of smoking light versus regular cigarettes. In the second survey of 1,026 light smokers, 14.7 percent of respondents agreed that, "smoking light cigarettes has less health risks than smoking regular cigarettes."[19] In the first survey of 627 light smokers, 62 percent of respondents perceived that smoking light cigarettes had less

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[15] "The CBC/HB System for Hierarchical Bayes Estimation," Version 3.2, Sawtooth Software, Inc. p. 26.

[16] See Hauser electronic material /Hauser 002/Cigarette HR Study/cig_unconstr /cghru.csv and my electronic material Tab01/cghr.unconstr.wtp.sas.

[17] I used the Dr. Hauser unconstrained willingness-to-pay estimates as input to Dr. Harris's method for estimating the mean willingness-to-pay. I found that Dr. Harris' method estimates a mean willingness-to-pay of 30.31 percent of the price per pack (95% confidence interval from 27.63 percent to 32.92 percent). See my electronic material Tab05/Z001a_unconstr.do.

[18] See my electronic material Tab01/cghr.unconstr.wtp.sas.

[19] Dr. John R. Hauser, "Hauser Draft Time Exhibits Light Cigarettes 121905.doc" and Hauser 696.

health risk than smoking regular cigarettes.[20] This inconsistency in responses between the two surveys is a further reason to doubt the reliability of Dr. Hauser's calculations. Using direct questions about the risks of smoking light versus regular cigarettes in Dr. Hauser's second survey implied a median willingness-to-pay of zero percent of the price per pack.[21]

15.   Confusing wording of survey instructions presented to the respondents in the first survey likely contributed to the inconsistency in responses between the two surveys. It is well known that suggestive or leading questions in a survey can bias the survey result.[22,23]

Dr. Hauser's Market Based Method

16.   Dr. Hauser uses his market based method to "determine the price difference at which the market, as represented by the survey respondents, would be indifferent between a 'light' cigarette with perceived health risks the same as 'light' cigarettes and a 'light' cigarette with perceived health risks the same as regular cigarettes."[24] He estimated that to be indifferent between the two hypothetical cigarettes the market, as represented by the survey respondents, would require a price discount of 39.8 percent of

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[20] See my electronic material, Tab01/cghr.hr.tst.sas.

[21] See my electronic material Tab01/cghr.wtp.sas.

[22] Stanley L. Payne, The Art of Asking Questions, Princeton University Press, Princeton, New Jersey,1980, pp. 177-180,194-196, 235.

[23] There is another indication of the lack of reliability of Dr. Hauser's willingness-to-pay calculation. It is reasonable that respondents would place a positive value on lower risk alternatives — other things equal. But, according to Dr. Hauser's calculations, 72.6 percent of respondents do not always place a positive value on lower risk alternatives. See my electronic material Tab01/cghr.pw.sas.

[24] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 47.

the price per pack on the light cigarette with perceived health risks the same as regular cigarettes compared to the light cigarette with the perceived health risks the same as light cigarettes.[25]

17.   The survey data on which Dr. Hauser relied permits a direct test of the reliability of Dr. Hauser's market based calculation. Of the 627 survey respondents, 233 responded to a question asked at the beginning of the survey (question 5b1) that they perceive no difference in health risk from smoking light versus regular cigarettes.[26] I repeated Dr. Hauser's market based calculation using only Dr. Hauser's estimates for the 233 survey respondents that perceived no difference in health risk from smoking light versus regular cigarettes. Dr. Hauser has adduced no logical reason why smokers would be willing to pay more for the health risk of a light cigarette versus the health risk of a regular cigarette when they perceive no difference in health risk between the two. Nevertheless, his market based calculation, when performed for the 233 respondents who perceive no difference in risk for light versus regular cigarettes, yields a discount of 32.0 percent of the price per pack.[27] I repeated Dr. Hauser's market based analysis using data from only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes. Dr. Hauser's model, using only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes, yields a discount of 28.1% percent of the price per pack.[28] Dr. Hauser has

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[25] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 11.

[26] See my electronic material Tab01/cghr.hr.tst.sas.

[27] See my electronic material Tab03/light_eq_regular_wtp.xls.

[28] See my electronic material Tab02/light_eq_regular_wtp2.xls.

adduced no logical reason why smokers would be willing to pay more for the health risk of a light cigarette versus the health risk of a regular cigarette when they perceive no difference in health risk between the two. Dr. Hauser's market based calculation is unreliable because it finds a large price discount for smokers who perceive no difference in risk.

18.   As another test of the reliability of Dr. Hauser's market based method, I calculated, using his method, the proportion of survey respondents who would choose to smoke light cigarettes. The result should be 100 percent because all survey respondents were light cigarette smokers. However, Dr. Hauser's method incorrectly predicts that only 74.3 percent of these light cigarette smokers would choose light cigarettes.[29]

Dr. Hauser's assessment of the importance of health risks to light cigarette consumers in their decision to purchase a light cigarette.

19.   Dr. Hauser states, "health risks are a positive contributing factor in the choice of 'light' cigarettes for 90.1 percent of 'light' cigarette consumers."[30] But, Dr. Hauser's figure of 90.1 percent is based on those who perceive a greater risk for cigarettes that have a risk "greater than a regular cigarette" versus cigarettes that have a risk "less than an 'ultra-light' cigarette."[31] An answer that the risk of cigarettes that have a risk "greater than a regular cigarette" is greater than the risk of cigarettes that have a risk "less than an

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[29] The 74.3 percent estimate is based on Hauser's randomized first choice method. The 74.3 percent estimate is statistically significantly lower than 100 percent. See my electronic material Tab03/Hauser_Market_Share_alt.xls.

[30] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 44.

'ultra-light' cigarette" is logically compelled. But many respondents perceive no difference in risk for light versus regular cigarettes even though they may perceive a difference in risk for cigarettes that have a risk "greater than a regular cigarette" versus cigarettes that have a risk "less than an 'ultra-light' cigarette." Thus, Dr. Hauser's analysis begs the question of the importance of health risks to light cigarette consumers in their decision to purchase a light cigarette.

20.   To answer the question of the importance of health risks to light cigarette consumers in their decision to purchase a light cigarette, I use the survey responses of the 627 smokers of light cigarettes studied by Dr. Hauser.   Of the 627 respondents, 233 perceive no difference in risk for light versus regular cigarettes.[32] For these respondents risk could not be a factor in their decision to purchase a light versus regular cigarette because they perceive no difference in risk. Another 8 of the 627 respondents perceive that light cigarettes have greater risk than regular cigarettes.[33] For these 8 respondents a preference for lower risk could not be a factor in their decision to purchase a light versus regular cigarette because they perceive no lower risk for light cigarettes. The remaining 386 (= 627 – 233 – 8) respondents report that they perceive a lower risk for light versus regular cigarettes. Of these 386 respondents, 360 report that they prefer the taste of light versus regular cigarettes.[34] Even if their perception of risk were instead that light cigarettes have the same risk as regular cigarettes, it is reasonable to expect that they still

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[31] Dr. John R. Hauser, Expert Witness Report, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 44, 45.

[32] See my electronic material Tab01/cghr.hr.tst.sas.

[33] See my electronic material Tab01/cghr.hr.tst.sas.

would have chosen light cigarettes over regular cigarettes because of their preference in taste.[35] Thus their decision to smoke light cigarettes would have been the same whether or not they perceive a lower risk for light versus regular cigarettes.

21.   Of the remaining 26 (= 386 – 360) smokers of light cigarettes who perceive lower risk of light cigarettes but did not report preferring the taste of light cigarettes, 18 did not report a taste preference while 8 (= 26 – 18) stated that they prefer the taste of regular versus light cigarettes.[36] For the 18 respondents who reported no taste preference, the survey results are uninformative about what their decision would have been but for their perception of lower risk for light versus regular cigarettes.[37,38] Only for those 8 or 1.28 percent (= 8/627) who stated that they prefer the taste of regular versus light cigarettes can it be reasonably inferred that their decision to smoke light versus regular cigarettes was determined by their perception of a lower risk for the light cigarettes.[39]

22.   I performed another test of the reliability of Dr. Hauser's conclusion about the importance of health risks to light cigarette consumers in their decision to purchase a

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[34] See my electronic material Tab01/cghr.hr.tst.sas.

[35] Deposition of Dr. John R. Hauser, Barbara Schwab et al. v Philip Morris USA, Inc. et al., May 19, 2006, p. 895.

[36] See my electronic material Tab01/cghr.hr.tst.sas.

[37] This is so because these 18 stated that they perceive no difference in taste for light versus regular cigarettes. Thus, their decision would be based on other factors not studied by the survey.

[38] Using Dr. Hauser's market share analysis, I also found no significant difference for the market share of light cigarettes with assumed risk of light cigarettes versus light cigarettes with assumed risk of regular cigarettes. See my electronic material Tab03/Hauser_Market Share alt.xls.

[39] 1.28% still does not represent the percent of class member that "relied" on the alleged wrongful conduct because Dr. Hauser does not consider defendants alleged wrong

light cigarette. I used Dr. Hauser's estimates to calculate the proportion of respondents for whom health risks are a contributing factor in the choice of light cigarettes using only the 233 respondents who perceive no difference in health risk from smoking light versus regular cigarettes. One can anticipate that the result of this calculation must be zero because all of the respondents involved in the calculation perceive no difference in health risks for light versus regular cigarettes. Contrary to good sense, Dr. Hauser's method found a difference in health risk to be a contributing factor in their choice of light cigarettes for 90.6 percent of the smokers who perceive <u>no difference in health risk</u> from smoking light versus regular cigarettes.[40] I repeated Dr. Hauser's analysis to calculate the proportion of respondents for whom health risks are a contributing factor in the choice of light cigarettes using data from only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes. Dr. Hauser's method found a difference in health risk to be a contributing factor in their choice of light cigarettes for 89.3 percent of the smokers who perceive <u>no difference in health risk</u> from smoking light versus regular cigarettes.[41]

23.   Dr. Hauser also attempts to "address whether perceived health risks are a significant contributing factor in 'light' cigarette consumers' purchase decisions by ranking importance measures of the feature."[42] Dr. Hauser states that:

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conduct or isolate the effect of the word light. Deposition of Dr. John R. Hauser, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 23, 2006, pp. 224-226.

[40] See my electronic material Tab01/cghr.lt_vs_reg.htvalue.sas.

[41] See my electronic material Tab02/light_eq_regular.xls.

[42] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 46.

Health risks are ranked above price by 26.8 percent of these consumers, above taste by 68.9 percent of the consumers, and above pack type by 94.4 percent of the consumers. Health risks are ranked above price or taste by 76.1 percent of these consumers.[43]

But, the perceived health risks that Dr. Hauser compares to other factors affecting consumers' purchase decisions are not the perceived health risks of light versus regular cigarettes. Instead they are the perceived health risks for cigarettes with risks "less than an ultra-light cigarette" versus cigarettes with risks "greater than a regular cigarette."[44] Dr. Hauser has adduced no basis for his treatment of responses regarding the perceived health risks that he compared (risks "less than an ultra-light cigarette" versus cigarettes with risks "greater than a regular cigarette") as though they were responses regarding perceived health risks that he did not compare (risks of a light cigarette versus risks of a regular cigarette).

Comments on Dr. Harris's Report

24.   Dr. Harris attempts to calculate a "loss of value" to class members based on a survey and accompanying conjoint analysis of Dr. Hauser.[45] As intermediate steps in his loss of value calculation, Dr. Harris calculated individual survey respondents' willingness-to-pay for differences in health risks of light versus regular cigarettes. Dr.

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[43] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 46.

[44] Dr. John R. Hauser, <u>Expert Witness Report</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 44.

[45] Jeffery E. Harris, <u>Expert Report</u>, Schwab, et al. v. Philip Morris, et al., September 6, 2005. ¶ 4.

Harris calculated a mean willingness-to-pay of 50.12 percent of the price per pack (95% confidence interval from 46.84 percent to 53.45 percent).[46]

25.   The Hauser survey data, on which Dr. Harris relies, permits a direct test of the reliability of Dr. Harris's willingness-to-pay result. Of the 627 survey respondents, 233 responded to a question asked at the beginning of the survey (question 5b1) that they perceived no difference in health risk from smoking light versus regular cigarettes.[47] I repeated Dr. Harris's willingness-to-pay calculation using only the 233 survey respondents that perceived no difference in health risk from smoking light versus regular cigarettes. Dr. Harris agrees that willingness-to-pay should be zero for individuals who "believed that lights were as dangerous or more dangerous than regular cigarettes."[48] Dr. Harris's willingness-to-pay calculation using only the Hauser estimates of the 233 survey respondents that perceived no difference in health risk from smoking light versus regular cigarettes finds a willingness-to-pay of 45.2 percent of the price per pack (95% confidence interval from 40.1 percent to 50.5 percent).[49] I repeated Dr. Hauser's willingness-to-pay analysis using data from only the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes. I then used those new estimates for the 233 survey respondents who perceived no difference in health risk from smoking light versus regular cigarettes in Dr. Harris's model. Dr.

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[46] Jeffery E. Harris, Expert Report, Schwab, et al. v. Philip Morris, et al., September 6, 2005. Table 1.

[47] See my electronic material Tab01/cghr.hr.tst.sas.

[48] Deposition of Dr. Jeffery E. Harris, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 10, 2006, p. 565.

[49] See my electronic material Tab05/Z001a_233.do.

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Harris's willingness-to-pay calculation finds a willingness-to-pay of 43.4 percent of the price per pack (95% confidence interval from 38.0 percent to 48.5 percent).[50] Dr. Harris has adduced no logical reason why smokers would be willing to pay more for the health risks of a light cigarette versus the health risks of a regular cigarette when they perceive no difference in health risk between the two. Dr. Harris's willingness-to-pay calculation is unreliable because it finds a large willingness-to-pay for a perceived zero difference in health risk of light versus regular cigarettes.

26.   Dr. Harris's calculations of individual survey respondents' willingness-to-pay initially yielded estimates of less than 0 percent for 18.3 percent of his estimates and greater than or equal to 100 percent for 39.4 percent of his estimates.[51] Dr. Harris changed the negative willingness-to-pay estimates to 0 percent and changed the willingness-to-pay estimates greater than 100 percent to 100 percent before calculating his mean willingness-to-pay percentage. Had Dr. Harris not modified his initial willingness-to-pay estimates, his mean willingness-to-pay would have been an unbelievable 1,670.4 percent of the price per pack (95% confidence interval from 966.5 percent to 2,476.6 percent).[52]

27.   Dr. Hauser stated, "The largest price discount examined in the survey was a 50% percent discount, hence, conservatively, I do not simulate any market with a price in which a brand uses a discount of more than 50%."[53] I repeated Dr. Harris's mean

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[50] See my electronic material Tab05/Z001a_233_HB.do.

[51] See my electronic material Tab05/Z001a_tab.do.

[52] See my electronic material Tab05/Z001a_nocap.do.

[53] Dr. John R. Hauser, "Expert Witness Report," Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, footnote 5.

willingness-to-pay calculation limiting the maximum individual estimates to 50 percent

to be consistent with the design of the underlying survey instead of the limit of 100

percent imposed by Dr. Harris. This yielded a mean willingness-to-pay of 30.0 percent

of the price per pack (95% confidence interval from 28.2 percent to 31.7 percent).[54]

28.   Dr. Harris's calculation of individual survey respondents' willingness-to-pay

involves another objectionable aspect. Dr. Harris calculated willingness-to-pay for

survey respondents using a ratio — the numerator of the ratio being the difference in a

respondent's estimated utility associated with different health risks and the denominator

of the ratio being the difference in respondent's estimated utility associated with different

prices.[55] For 29.7 percent of Dr. Harris's willingness-to-pay ratios the denominator was

zero. The value of a ratio with a denominator of zero is undefined. Dr. Harris arbitrarily

assigned all of the undefined willingness-to-pay ratios a value of 100 percent.[56]

Comments on Dr. Beyer's December 19, 2005 Amended Report[57]

29.   In his December 19, 2005, Amended Report in this case, Dr. Beyer concludes, "If

a conspiracy such as the one alleged here existed, then the market price for all cigarettes,

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[54] See my electronic material Tab05/Z001a_cap50.do.

[55] See Harris electronic material Z001a.do.

[56] See my electronic material Tab05/Z001a_tab.do.

[57] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005. Dr. Beyer submitted earlier reports dated February 25, 2005, March 29, 2005, and September 9, 2005. I submitted earlier reports dated August 1, 2005 and June 30, 2005 commenting on Dr. Beyer's earlier reports.

including light cigarettes, would have been higher. As a result of the higher market price, all members of the proposed class would have been harmed in that they would have paid more for light cigarettes than otherwise would have been the case."[58] Dr. Beyer calculates the extent of this alleged harm to the class as "between $43.8 billion and $56.6 billion."[59] Dr. Beyer's estimates of damages are overstated and unreliable.

Dr. Beyer's "Revised Price Impact Model"

30.   Dr. Beyer's calculation of harm to the class of "between $43.8 billion and $56.6 billion" is based on his "revised price impact model."[60] This is a statistical regression model that purports to explain year-to-year prices of cigarettes in terms of "factors that might affect cigarette prices" plus additional indicator variables that designate the time periods 1972–1976, 1977–1981, 1982–1986, 1987–1991, 1992–1996, and 1997–1998.[61]

31.   The inclusion of indicator variables in the statistical regression model is nothing more than a simple way to test if one or more factors that might affect cigarette prices have been omitted from the model. The indicator variables can identify systematic variation in the price variable that the model has not otherwise accounted for. Although

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[58] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶6.

[59] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 8.

[60] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 9.

[61] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 26.

the indicator variables may demonstrate that something is missing from the model, they

do not say what it is:

> The dummy [or indicator] variable coefficient reflects ignorance
> — they are inserted merely for the purpose of measuring shifts in
> the regression line arising from unknown variables.[62]

Any factor not comprehended by Dr. Beyer's regression equation that affects cigarette

price differently in the periods before and after 1972 will be measured to some extent by

the indicator variables. Dr. Beyer terms his time-period indicator variables "Light

Cigarette Indicators" because he chooses to associate the coefficients of these indicator

variables with a price increase caused by the alleged conspiracy.[63] But there is nothing

inherent in the indicator variables — which merely indicate periods of time — that would

cause them to zero in on a light cigarette conspiracy as opposed to any of a number of

other factors not represented in Dr. Beyer's regression model.

32.   Among the factors not represented in Dr. Beyer's regression equation are (1) the

entry of new cigarette manufacturers, (2) generic cigarettes, (3) ultra-lights, (4)

workplace and other smoking restrictions, (5) pre-1998 settlements with Mississippi and

Florida Attorneys General and (6) changes in cigarette marketing practices. The

coefficients of the indicator variables in Dr. Beyer's regression model demonstrate that

his model has failed to include unknown but relevant factors affecting prices. This is a

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[62] Peter Kennedy. A Guide to Econometrics: Third Edition. Cambridge: MIT Press, 1994, p. 222.

[63] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 29 and Table 2.

deficiency of his model. Dr. Beyer has treated a demonstration of the deficiency of his

model as if it were a valid method for measuring damages in this case, which it is not.

33.   To further demonstrate that Dr. Beyer's indicator variables cannot be relied on to

isolate the effect of a conspiracy I made a small adjustment to the indicator variables

defined by Dr. Beyer. According to Dr. Beyer, such a small adjustment should have no

important consequence for his findings.[64] Instead of five indicator variables designating

successive five-year periods followed by a sixth designating a final two-year period

(1997–1998) as selected by Dr. Beyer, I substituted an indicator variable designating an

initial two-year period (1972–1973) followed by five indicator variables designating

successive five-year periods. I made no other changes to Dr. Beyer's price impact model.

When I put the two-year indicator at the beginning (1972–1973) rather than at the end

(1997–1998) Dr. Beyer's model estimated negative and statistically significant damages

of between negative $134 billion and negative $149 billion.[65] Dr. Beyer offers no

principled basis for his selection of five, five-year periods followed by one two-year

period,[66] as opposed to the simple variation I tested. Thus, Dr. Beyer has no principled

basis to assert positive damages rather than negative damages.

34.   To further demonstrate the role of an indicator variable as a test for the omission

of relevant variables, I made one change to Dr. Beyer's price model. I extended the set of

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[64] "Choosing slightly different five year periods would not result in significantly different overcharge measures." Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 27.

[65] See my electronic material Tab10/price_light7273.sas.

[66] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 434.

indicator variables in Dr. Beyer's regression equation by including one additional

indicator for the five-year period of 1967–1971. This new indicator variable was

identified by the regression analysis as statistically significant — meaning that one or

more unidentified factors associated with price have been omitted from the model.[67]

Because this additional indicator designates a portion of the time period prior to the

alleged light cigarette conspiracy, it points to an omitted factor that is unrelated to the

alleged conspiracy. Statistical models that omit significant explanatory variables produce

biased and untrustworthy results.

35.   Dr. Beyer states that he tested the results of his price model by comparing those

results to the results of a price model with a single light indicator variable.[68] I added an

indicator variable for the five-year period of 1967 though1971 to Dr. Beyer's price

model, which employs a single light indicator variable. With this one change, his model

estimates negative and statistically significant damages for all knowledge lags from 1

through 15 years.[69]

36.   In addition to the indicator variable test, statisticians have developed other

statistical tests that are used to identify inadequacies of a statistical model, such as

omitted relevant variables or improper specification of the relationship among included

variables. I have performed three additional statistical tests. Each of these tests confirm

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[67] 1967–1971 was the first five-year period following the first required health warnings on cigarette advertising and packages. Congress banned the broadcast of cigarette advertising in 1971. JE Harris, The 1983 Increase in the Federal Cigarette Excise Tax, Tax Policy & the Economy, Vol. 1, Cambridge, MA: M.I.T. Press, 1987. See my electronic material Tab11/price_light6771.sas.

[68] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 425.

[69] See my electronic material Tab16/price_light6771_7298.sas.

that Dr. Beyer's model omits significant explanatory variables or improperly specifies the relationship among included variables, and therefore produces biased and untrustworthy results.[70]

37.   Dr. Beyer stresses the importance of doing sensitivity analyses to ensure that his statistical estimates are robust to changes of model specification.[71] Dr. Beyer chose to specify the regression equation of his revised price impact model using the logarithm of his "knowledge" variable as one of the explanatory variables.[72] To test the sensitivity of Dr. Beyer's damages calculation to the specification he chose for the knowledge variable, I substituted the untransformed version of the variable for its logarithm and recalculated the regression. With only this one change the model yields statistically significant damages of <u>negative</u> $3.7 million.[73] Dr. Beyer admitted that he has no principled basis to prefer the logarithm of his knowledge variable to the untransformed version of the variable.[74] Thus, Dr. Beyer has no principled basis to assert positive damages rather than negative damages.

38.   To illustrate the untrustworthy nature of the method used by Dr. Beyer I applied his method using only his data from the period 1955 to 1981. Dr. Beyer's analysis

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[70] The three tests are the Runs test, the Durbin-Watson test and the Ramsey reset test. See my electronic material Tab08/Runs-NotByState-centerline0.sas, DurbinWaston.sas, and reset.sas.

[71] <u>Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶11 and footnote 13.

[72] A logarithm is an exponent. The logarithm of a number x in base b is the number n such that $b^n = x$. For example, the logarithm of 9 in base 3 is 2, because $3^2 = 9$.

[73] For this analysis I used Dr. Beyer's eight-year lag. See my electronic material Tab12/price_nonlog_know.sas.

[74] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, pp. 415-416.

estimates a statistically significant <u>negative</u> association between the introduction of light

cigarettes and cigarette price for the first 10 years after the introduction of light

cigarettes.[75]

39.   Dr. Beyer's price analysis is based on data from the period 1955 though 1998.

Dr. Beyer assumes, without basis, that his analysis of the data ending in 1998 can be used

to estimate damage in the period 1999 through 2004.[76] Dr. Beyer's damage estimate for

the period 1999 thought 2004 is more than 44 percent of his total damage estimate.[77]

40.   Dr. Beyer's damage estimates based on his price model are unbelievable on their

face because they predict that, but for the alleged wrongful conduct from the defendants,

the defendants would have sold cigarettes at a loss.[78]

Dr. Beyer's "knowledge impact variable"

41.   Dr. Beyer describes at length the meaning and importance of the "knowledge

impact variable", which he distills from various newspapers and features in his analysis.[79]

Dr. Beyer's use of an elaborately constructed "knowledge" variable, the lengthy story he

tells about the delayed impact of knowledge, and his statistical search for the degree of

delay of that impact, all appear to lend weight and an aura of science to his price model.

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[75] See my electronic material Tab15/price_1light_le81.sas.

[76] Dr. Beyer states that he excluded data after 1998 "to separate the effect of light cigarettes on market price from the effect the Master Settlement Agreement might have had on cigarette price." <u>Expert Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies</u>, March 28, 2005, ¶ 47.

[77] See my electronic material Tab09/price_rep.sas.

[78] See my electronic material Tab14/cig_price_cost.xls.

[79] <u>Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies</u>, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶19-24.

But this is an illusion. It is easy to show that Dr. Beyer's "knowledge impact variable" plays no crucial role in his damage calculation at all. To show this, I replaced Dr. Beyer's elaborately constructed "knowledge impact variable" in his price model with a variable measuring annual attendance at New York Yankee home baseball games[80] — a variable no one would suggest is key to understanding cigarette prices. Dr. Beyer's price model finds approximately the same degree of damage when it is based on Yankee attendance as it does when based on his "knowledge impact variable".[81] Table 1 shows "damage" estimates from Dr. Beyer's price model using a Yankee attendance variable versus a "knowledge impact variable".[82]

Table 1: Damages ($Millions) From Dr. Beyer's Price Model Using a Yankee Attendance Variable versus a Knowledge Impact Variable

Lag	Beyer's Knowledge Impact[83]	Yankee Attendance[84]
7	59,508	75,107
8	62,840	77,619
9	56,074	80,075
10	48,625	83,953

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[80]http://newyork.yankees.mlb.com/NASApp/mlb/nyy/history/year_by_year_results.jsp?sortByStat=ATTENDANCE&

[81] The Yankee Attendance variable is found by Dr. Beyer's price model to be a statistically significant determinant of cigarette prices.

[82] I also replaced Dr. Beyer's "knowledge impact variable" in his price model with a variable measuring the historic whooping crane population (http://www.savingcranes.org/pdf/whooper_table.pdf). Damage estimates from Dr. Beyer's price model including a whooping crane population variable (and not including a "knowledge impact variable") range from $46.9 billion to $62.0 billion (See my electronic material Tab17/price_dropknow_whoopingcrane.sas).

[83] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, Table 10-13.

[84] See my electronic material Tab18/price_dropknow_yankeesattendance.sas.

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Dr. Beyer's "consumption model"

42.   Dr. Beyer uses a second regression model, which he terms a "consumption model", to reach his conclusion that "knowledge impact" can have no effect on price until seven to ten years after the "knowledge" appears in one of three newspapers.[85] Dr. Beyer explains that he picked lags for the impact of "knowledge" of seven to ten years because for those lags his consumption model found a statistically significant "inverse relationship between his knowledge impact variable and cigarette consumption."[86]

43.   Other plaintiffs' experts in this case — Drs. Nye, Stiglitz, Harris, Burns, Cohen, and Proctor — have stated that information events relating to smoking and health have had an immediate impact on cigarette consumption.[87]

44.   Dr. Beyer's finding that "knowledge impact" can have no effect on price until seven to ten years after the "knowledge" appears in one of three newspapers depends critically on several choices he made when he conducted his consumption analysis. Dr. Beyer provides no principled basis for these critical choices. His consumption model finds no statistically significant "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag (from lag 1 through lag 15) when alternative choices are used in place of Dr. Beyer's unprincipled choices.

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[85] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 23.

[86] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 23.

[87] Expert Report of Blaine F. Nye, Ph.D., March 28, 2005, pp. 5-6; Expert Report of Joseph Stiglitz, February 28, 2005, p. 26; Expert Report of Jeffrey E. Harris in *Blue Cross Blue Shield of New Jersey v. Philip Morris Inc.*, November 29, 1999, pp. 6-8, 43-45; Deposition of David Burns, June 14, 2005, pp. 151-52; Deposition of Joel Cohen, May 10, 2005, pp. 173-75; Deposition of Robert Proctor, May 11, 2005, pp. 67-71.

45.   In his consumption model Dr. Beyer chose to use values of his knowledge variable as they were, without taking the logarithm of the values. Dr. Beyer identifies no principled basis to choose one over the other, that is, he has no principled basis to choose the values as they were as opposed to choosing the logarithm of those values.[88] In his price model he made the opposite choice — again without basis and again with an important consequence for his result (see ¶ 37). I made one change to his consumption analysis. I used the logarithm of his knowledge impact variable (just as he had done in his price analysis). With this one change Dr. Beyer's consumption model finds no statistically significant "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag.[89]

46.   In his consumption model Dr. Beyer chose to use one "light" indicator variable rather than the six indicator variables he used in his price model. Dr. Beyer identifies no principled basis to choose one over the other, that is, he has no principled basis to choose one rather than six indicator variables.[90] I made one change to his consumption model. I changed his consumption analysis to include the six "light" indicator variables rather than one. With this one change Dr. Beyer's consumption model finds no statistically

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[88] "Q.   Is there some economic theory that when you specified the model led you to use the log of consumption on the left side and the levels of the other variables on the right side?

    A.   No, and I tested that and it doesn't matter. Same results."
Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 412.

[89] See my electronic material Tab07/cons_logknow.sas.

[90] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, pp. 425 - 430.

significant "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag.[91]

47.   In his consumption model Dr. Beyer chose to use national-level data rather than the state-level data he used in his price model.[92] Dr. Beyer identifies no principled basis to choose national-level data over the state-level data.[93] Dr. Beyer stated that the use of state-level data in his consumption model would increase the model's robustness.[94] Dr. Beyer stated, "Most academic authors have used state-level data in their analysis of cigarette demand."[95] I made one change to his consumption model. I changed his consumption model to include state-level data rather than national-level data. With this one change Dr. Beyer's consumption model finds no statistically significant "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag.[96]

48.   In his consumption model Dr. Beyer did not include a variable for tobacco company advertising and promotion expenses even though he included such a variable in his price model.[97] Dr. Beyer states that advertising and promotion can have an effect on

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[91] See my electronic material Tab07/cons_6light.sas.

[92] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 420.

[93] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 421, lines 6 - 13.

[94] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, pp. 420-421.

[95] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 11.

[96] See my electronic material Tab07/cons_state.sas.

[97] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 435.

cigarette consumption.[98] Dr. Beyer identifies no principled basis to exclude tobacco company advertising and promotion expenses.[99] I made one change to his consumption model. I included a variable to measure tobacco company advertising and promotion expenses. With this one change Dr. Beyer's model finds no statistically significant "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag.[100,101]

Dr. Beyer's adjustment "to reflect only those light cigarette smokers who relied upon the health claims of light cigarettes in deciding to smoke lights."[102]

49.   Dr. Beyer states, "I have further refined my damage estimates to include only light cigarette purchasers who relied on the alleged fraud in smoking light cigarettes."[103]

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[98] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., June 2, 2005, pp. 171-172. Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 435.

[99] Deposition of Dr. John C. Beyer, Barbara Schwab et al. v Philip Morris USA, Inc. et al., March 30, 2006, p. 439.

[100] See my electronic material Tab07/cons_advt.sas.

[101] Dr. Beyer's consumption model also finds no "inverse relationship between his knowledge impact variable and cigarette consumption" at any lag when promotional expense (not including advertising expense) is included as a variable in his consumption regression. See my electronic material Tab07/cons_promo.sas.

[102] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 28.
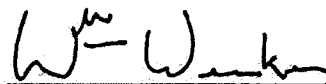
[103] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 6.

Dr. Beyer performs his adjustment by multiplying his estimate of damage by 90.1 percent. Dr. Beyer obtains the 90.1 percent figure from Dr. Hauser.[104]

50.   Dr. Hauser's 90.1 percent figure is not a reliable measure of "light cigarette smokers who relied upon the health claims of light cigarettes in deciding to smoke lights." See paragraphs 19 through 23 above.

51.   I, William E. Wecker, declare under penalty of perjury that the foregoing is true and correct.

Dated this 26ᵗʰ day of ___May___, 2006.

                                        _____
                                        William E. Wecker

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[104] Amended Report of John C. Beyer, Ph.D. Regarding Class-Wide Damages and Damage Methodologies, Barbara Schwab et al. v Philip Morris USA, Inc. et al., December 19, 2005, ¶ 28.